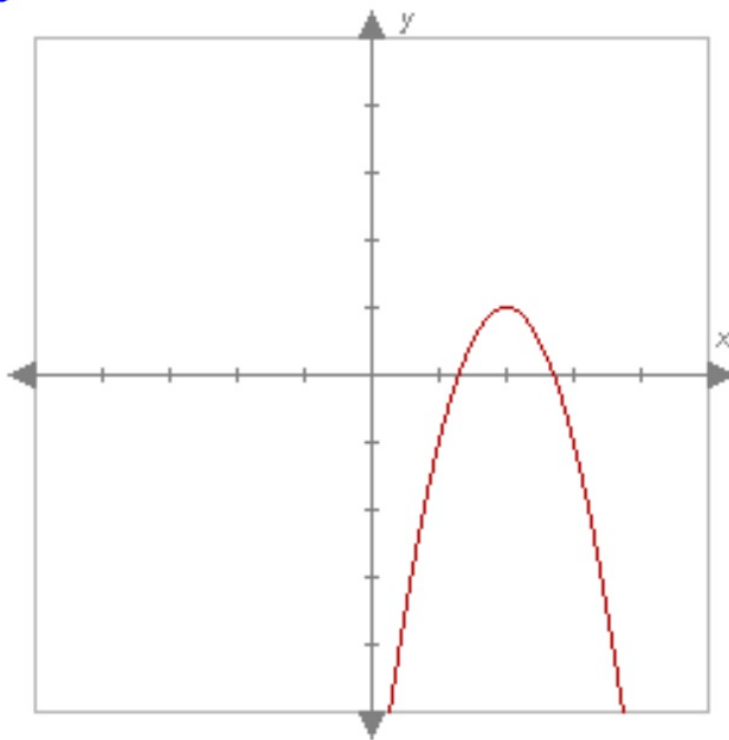


3/5/14

Identify the equation for a parent function whose graph has been stretched or compressed.

quadratic family  
 $y = x^2$



## 5.1 What is a Polynomial?

3/5/14

**Identify an algebraic expression that represents a polynomial; identify the coefficients, variables, and degree of a given polynomial; and describe the end behavior of polynomial functions.**

An expression is a polynomial *if and only if* it meets **all** of the following conditions:

1. There are no variables in the denominator of any fraction.
2. There are only whole number exponents (0, 1, 2, ...) — no fractional or negative exponents.
3. There are no variables in a radical expression.
4. All coefficients are real, though they may be fractions, radicals, or irrational numbers.

## 5.1 What is a Polynomial?

3/5/14

Identify an algebraic expression that represents a polynomial; identify the coefficients, variables, and degree of a given polynomial; and describe the end behavior of polynomial functions.

Which of the following are polynomials?

~~A.~~  $\frac{1}{x} + 3$

☒ B.  $x^3 + x - 2$

~~C.~~  $x^{-2} - 16 = \frac{1}{x^2} - 16$

~~D.~~  $x^4 - x^3 + x^{\frac{1}{2}}$

~~E.~~  $\sqrt{x-2} + 12$

☒ F.  $\frac{1}{3}x^4 + 2.3x^2$

$3ix$   
 $\sqrt{-3}x$   
imagin

Which of the following are polynomials?

☒ A.  $x + 2$

~~B.~~  $x^{-2} - x + 4$

☒ C.  $x^2 - 16x + \frac{1}{7}$

~~D.~~  $\sqrt{6-x} - x$

☒ E.  $x^2 - \sqrt{6}$

☒ F.  $0.23x^4 - \frac{3}{5}x^3 + \sqrt{5}$

## 5.3 Imaginary Numbers

3/5/14

IWBAT define complex numbers, apply arithmetic operations to complex numbers, and identify the equivalent expression, given "i" raised to the nth power. I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.



## 5.3 Imaginary Numbers

3/5/14

What is an imaginary number?

$\sqrt{-1}$  is imaginary because  $(1)^2 = (-1)^2 = 1$   
 $\sqrt{-1} = i$

What is the square root of -16?

$$\sqrt{-16} = \sqrt{4 \cdot 4 \cdot -1} = 4\sqrt{-1} = 4i$$

$$\sqrt{-50} = \sqrt{25 \cdot 2 \cdot -1} = 5i\sqrt{2}$$

What is a complex number?

$$a + bi$$

$$3 + 7i$$

$$\sqrt{-50} = 0 + 5i\sqrt{2}$$

$$\sqrt{50} = 5\sqrt{2} + 0i$$

IWBAT define complex numbers, apply arithmetic operations to complex numbers, and identify the equivalent expression, given "i" raised to the nth power.

## 5.3 Imaginary Numbers

3/5/14

Adding & Subtracting Complex Numbers

$$(3 + 2i) + (5 + 3i)$$

$$(3 + 5) + (2i + 3i) \\ (8 + 5i)$$

$$(5 + 3i) - (3 + 2i)$$

$$(5 - 3) + (3i - 2i) \\ (2 + i)$$

$$(3 - 2i) + (1 + 3i)$$

$$(3 + 1) + (-2i + 3i) \\ (4 + i)$$

$$(3 - 2i) - (1 + 3i)$$

$$(3 - 1) + (-2i - 3i) \\ (2 + -5i) = (2 - 5i)$$

IWBAT define complex numbers, apply arithmetic operations to complex numbers, and identify the equivalent expression, given "i" raised to the nth power.

## 5.3 Imaginary Numbers

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### Multiplying Complex Numbers

$$(3 + 2i)(5 + 3i)$$

$$15 + 9i + 10i + 6i^2$$

$$i^2 = \sqrt{-1}^2 = -1$$

$$15 + 19i + 6(-1)$$

$$9 + 19i$$

$$(3 - 2i)(1 + 3i)$$

$$3 + 9i - 2i - 6i^2$$

$$3 + 7i - 6(-1)$$

$$9 + 7i$$

IWBAT define complex numbers, apply arithmetic operations to complex numbers, and identify the equivalent expression, given "i" raised to the nth power.

## 5.3 Imaginary Numbers

### Dividing Complex Numbers

3/5/14  
Conjugate of the denominator  
 $a + bi \Rightarrow a - bi$

$$\frac{(3+2i)}{(5+3i)} \cdot \frac{(5-3i)}{(5-3i)}$$

$$\frac{15 - 9i + 10i - 6i^2}{25 + 15i - 15i - 9i^2}$$

$$\frac{15 + i - 6(-1)}{25 - 9(-1)}$$

$$\frac{21 + i}{34} = \frac{21}{34} + \frac{1}{34}i$$

IWBAT define complex numbers, apply arithmetic operations to complex numbers, and identify the equivalent expression, given "i" raised to the nth power.



### 5.3 Imaginary Numbers

3/5/14

$$\frac{(6-i)}{(4+2i)} \cdot \frac{(4-2i)}{(4-2i)} = \frac{24-12i-4i+2i^2}{16-4i^2} = \frac{24-16i+2(-1)}{16-4(-1)}$$

$$\frac{22-16i}{20} = \frac{22}{20} - \frac{16}{20}i = \frac{11}{10} - \frac{4}{5}i$$

$$\frac{(3-2i)}{(1-3i)} \cdot \frac{(1+3i)}{(1+3i)} = \frac{3+9i-2i-6i^2}{1-9i^2}$$

$$\frac{3+7i-6(-1)}{1-9(-1)} = \frac{9+7i}{10} = \frac{9}{10} + \frac{7i}{10}$$

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## 5.3 Imaginary Numbers

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Equivalent Expressions

$$i^2 = (\sqrt{-1})^2 = -1$$

$$i^3 = (i^2) \cdot i = -i$$

$$i^6 = (i^2)^3 = -1$$

$$i^8 = (i^2)^4 = 1$$

$$i^{15} = (i^2)^7 \cdot i = -i$$

$$i^{12} = (i^2)^6 = 1$$

Patterns?

$i$  to an odd power, answer contains  $i$

$i^2$  to an odd power, answer is negative

$i^2$  to an even power, answer is positive

IWBAT define complex numbers, apply arithmetic operations to complex numbers, and identify the equivalent expression, given "i" raised to the nth power.

## 5.3 Imaginary Numbers

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$$i^{22} = (i^2)^{11} = -1$$

$$i^{36} = (i^2)^{18} = 1$$

$$i^{63} = (i^2)^{31} \cdot i = -i$$

$$i^{18} = (i^2)^9 = -1$$

$$i^{121} = (i^2)^{60} \cdot i = i$$

$$i^{16} = (i^2)^8 = 1$$

IWBAT define complex numbers, apply arithmetic operations to complex numbers, and identify the equivalent expression, given "i" raised to the nth power.

## 5.3 Imaginary Numbers

3/5/14

Vocabulary 5.3.1 p. 29  
Practice problems 5.3.2

Complete quizzes  
5.3.3 & 5.3.4

IWBAT define complex numbers, apply arithmetic operations to complex numbers, and identify the equivalent expression, given "i" raised to the nth power.